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In a study focusing on intrinsic motivation as a possible approach to improving the motivation and productivity of Air Force personnel, a factors list was generated from a literature review and intuitive analysis. Performance feedback was selected for further study. Fourteen feedback dimensions were identified and defined; and a number of psychological processes were outlined in terms of possible relationships with feedback. Two feedback dimensions were then selected and manipulated in an experimental setting. The first dimension, specificity, varied the amount of information subjects received about their error types. The second dimension was absolute versus comparative feedback. Thirty-one subjects were given either their own performance data or their own plus their relative group standing. Results showed a positive effect for feedback on performance and errors. Nonspecific feedback contributed most to performance increases and error reduction, and within the nonspecific condition, comparative was found to be superior. The findings were also explained in terms of psychological processes. It was concluded that increasing performance feedback shows good potential for ultimately enhancing productivity in Air Force field settings. (Author/CSS)

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EFFECTS OF SPECIFIC VS. NONSPECIFIC AND ABSOLUTE VS. COMPARATIVE FEEDBACK ON PERFORMANCE AND SATISFACTION

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May 1978
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The first portion of this report focused on intrinsic motivation as a possible approach to improving the motivation and productivity of Air Force personnel. While it was acknowledged that our knowledge of intrinsic motivation is limited, it was concluded that the use of intrinsic determiners offers great potential for improving motivation, and hence productivity. A list of these factors was generated from reviewing the literature and by intuitive analysis. For this report, performance feedback was selected for further study. Various dimensions of feedback were then identified and defined. In addition, a number of psychological processes were outlined in terms of their possible relationships with feedback. Two dimensions of feedback were then selected and manipulated in an experimental setting.

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The first dimension, specificity, varied the amount of information subjects received about the types of errors they made. The second dimension was absolute versus comparative feedback. Subjects were either given only their own performance data or their own plus their relative standing in their work group. Results showed a positive effect for feedback on both performance and errors. Nonspecific feedback was found to contribute most to increases in performance and reduction in errors, and within the nonspecific condition comparative was found to be superior. Results are also presented which attempt to explain the findings in terms of the psychological processes outlined earlier. It was concluded that increasing performance feedback shows good potential for ultimately enhancing productivity in Air Force field settings.

PREFACE

The work reported in this study was funded by the Air Force Office of Scientific Research (AFOSR). This work was related to ongoing research in the Occupation and Manpower Research Division of the Air Force Human Resources Laboratory. Dr. Joe T. Hazel and Capt John O. Edwards, Jr., were the monitors from this Division. The research was completed under project 2313, Human Resources; 2313T1, Job Requirements and Personnel Utilization; work unit 2313T107, Improved Productivity Through Use of Intrinsic Rewards.

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EFFECTS OF SPECIFIC VS. NONSPECIFIC AND ABSOLUTE VS. COMPARATIVE FEEDBACK ON PERFORMANCE AND SATISFACTION

I. INTRODUCTION

In its attempts to maximize the effectiveness of its personnel, the Air Force has two basic types of strategies at its disposal. The first is to get the best possible person into the field. This is accomplished through selection and training. The second strategy is to maximally motivate the person once he is on the job. Over the years, the Air Force has expended considerable resources in the areas of selection and training, with the result being highly sophisticated procedures currently in use in these areas. Less resources have been expended on exploring the second strategy – maximizing work motivation.

One of the reasons for this lesser attention to the motivation question is that we simply know less about motivation. The technologies for developing effective selection and training programs are available; but the technologies for increasing motivation are much more ambiguous and less well understood.

Currently available motivation strategies fall into two major categories. The first is generally termed extrinsic motivation and, in essence, attaches organizationally controlled rewards to performance. These rewards could be in the form of financial bonuses, pay raises, special assignments, etc. The second strategy is usually termed intrinsic motivation. Intrinsic motivation techniques attempt to arrive at a situation where the person desires to be a high performer, because being a high performer is seen as valuable for its own sake.

A very important question that is quite relevant to enhancing productivity in the Air Force, as well as other organizations, is which of these two types of motivation techniques – intrinsic or extrinsic – is more effective. Unfortunately, the answer is not as simple as the question. Clearly, extrinsic motivation techniques will work in some situations, and obviously extrinsic rewards must be part of the total reward system. However, using additional extrinsic rewards to increase performance, once the person is on the job, has some disadvantages. Probably the two biggest disadvantages are difficulty of administration and the possibility that, over time, the rewards will lose their power to motivate.

This suggests that the intrinsic techniques should be carefully explored. In essence, this is the purpose of the research program of which this report forms a part.

In exploring the literature on intrinsic motivation, it quickly becomes clear that a number of factors show promise as sources of intrinsic motivation. These factors generally fall into three categories: characteristics of rewards, characteristics of the task, and characteristics of the individual. Concerning the first source, Herzberg is usually credited with the distinction between intrinsic and extrinsic rewards (Herzberg, 1966; Herzberg, Mausner, & Snyderman, 1959). The intrinsic-extrinsic dichotomy of rewards has remained popular among psychologists. A simple implication of the distinction is that intrinsic rewards account for a different kind of motivation than do extrinsic rewards. Although it may be appealing to suggest that rewards differ in their source and their effect on motivated behavior, there is little evidence to support such a stand. Dyer and Parker (1975) have surveyed psychologists and found very little agreement concerning the conceptual meaning of the intrinsic-extrinsic dichotomy. These findings tend to reinforce the conclusion that there is little evidence that intrinsic motivation is determined by a set of rewards that are qualitatively distinct from those that determine extrinsic motivation.

A number of studies have dealt with the effects of extrinsic rewards on intrinsic motivation, as though the two were incompatible or at least interactive (Deci, 1971, 1972a, 1972b; Deci, Cascio, & Krusell, 1975; Harlow, 1953; Kruglanski, Alon, & Lewis, 1972; Lepper, Green, & Nisbett, 1973; Pritchard, Campbell, & Campbell, 1977; Ross, 1975). Generally these studies have demonstrated that the application

of extrinsic rewards decreases intrinsic motivation. That is, while extrinsic rewards are obviously critical to any organizational reward system, making these external rewards *contingent* on performance may have an unintended negative consequence of decreasing intrinsic motivation. (We should note, however, that contingent extrinsic reward systems may increase extrinsic motivation.) The most reasonable explanation for this phenomena is that extrinsic rewards can (but do not *necessarily*) reduce or interact with intrinsic motivation. Deci has suggested that any reward carries information concerning an individual's personal control and competence. To the extent that a reward decreases these two variables, then intrinsic motivation may also decrease. The implication is that personal control and competence are determinants of intrinsic motivation which may increase or decrease in the presence of an extrinsic reward system. Such a conceptualization is consistent with DeCharms' (1968) work regarding personal causation and White's (1959) explanation of competence. Increased personal control has also been seen as a critical variable for explaining motivation in the areas of organizational control (Dalton, 1971; Ivancevich, Donnelly, & Lynn, 1970; Tannenbaum, 1962) and participative decision making (Alutto & Belasco, 1972; Lowin, 1968; Patchen, 1970; Powell & Schlacter, 1971; Siegel & Ruh, 1973; Vroom, 1960).

It seems obvious that certain characteristics of a task can also influence intrinsic motivation. Promising research in this area has been done by Hackman and Oldham (1975) that is largely an extension of previous work by Turner and Lawrence (1971) and Hackman and Lawler (1971). The Hackman and Oldham model is generally as follows: five core dimensions lead to three psychological states which, in turn lead to certain outcomes – one of which is high internal work motivation. The links between job dimensions and psychological states, and between psychological states and outcomes are hypothesized to be moderated by individual differences.

The five core job dimensions, or more simply task characteristics, could be considered as task-related determinants of intrinsic motivation. The five characteristics (skill variety, task identity, task significance, autonomy, and feedback) are directly adapted from the six "Requisite Task Attributes" that were used by Turner and Lawrence (1971) and by Hackman and Lawler (1971) to test the relationships between the nature of jobs and employee behaviors.

Taken alone, these five job characteristics are simply dimensions along which any job or task can be "enriched," much as Ford (1969) would suggest. However, because there is compelling evidence for moderating effects of individual differences, Hackman and Oldham take the position that an enriched task only has high *potential* for prompting intrinsic motivation. In other words, a task that is high on skill variety, task identity, task signficance, autonomy, and feedback is a necessary, but not sufficient condition for high intrinsic motivation. What is also needed is an individual who is receptive to the motivational potential of the task. Individual characteristics, thus, are a third general source of determinants of intrinsic motivation.

Hackman and Oldham postulate that growth need strength is an individually-based influence on intrinsic work motivation. In the framework of their model, growth need strength moderates the relationship between task characteristics, psychological states, and internal work motivation. In fact, they report significant support for the hypothesis that high growth need strength people react more positively to high potential jobs than do low growth need strength individuals. In view of this evidence, it seems reasonable to postulate that differences in growth need strength may serve as a determinant of intrinsic motivation.

As mentioned previously, a number of moderators of the relationship between task complexity and worker responses have been identified. Support has been found for moderating effects of "extrinsic" versus "intrinsic" work values (Robey, 1974), cultural and subcultural differences (Blood & Hulin, 1967; Hulin & Blood, 1968; Turner & Lawrence, 1965), and the Protestant work ethic (Wanous, 1974).

From a more classical view of motivation, Hunt (1965) and Scott (1966) suggest that optimal arousal mechanisms account for the phenomena of intrinsic motivation. Hunt presents a detailed developmental explanation of intrinsic motivation based upon the idea of an optimal level of incongruity. Basically, Hunt's theory holds that an individual acquires an extensive set of standards against which sensory and informational inputs are compared. If such comparisons result in incongruity above (or below) an optimal

level, the organism's intrinsic motivation will be less than maximum. Supposedly, this explanation is designed to account for both classical arousal theories and more contemporary cognitive dissonance models.

Scott, on the other hand, simply hypothesizes the existence of an optimal level of arousal at which motivation is at a maximum. This position, which in the final analysis is very similar to Hunt's, makes a significant statement concerning intrinsic motivation in a work situation. Tasks are said to foster intrinsic motivation to the extent that they create optimal levels of arousal in workers. Since there are individual differences in these optimal levels, any given task would probably contribute to motivation differently across individuals. In short, a task heavily enriched with intrinsic characteristics would not be equally motivating for all persons. Depending on individual differences, such a task could actually result in too high or too low an arousal level for optimal motivation.

Based on this literature, as well as on intuitive analysis, we can now identify a number of potential determinants of intrinsic motivation. These are listed in summary form as follows.

1. Feelings of personal control over the task.
2. Feelings of competence at doing the task.
3. Contingent extrinsic rewards. (Negatively related).
4. Degree of variety in the skills required to do the task.
5. Degree to which the task requires the use of valued abilities.
6. Degree to which the person identifies with the task.
7. Degree to which the person does a complete unit of the task.
8. Perceived significance of the task.
9. Degree of autonomy on the task (related to item 1).
10. Adequacy of performance feedback.
11. Higher order need strength.
12. Work values.
13. Cultural influences.
14. Optimal arousal level.

With this general overview in mind, we now turn to the specific topic of this report. This report represents one of a series of efforts to systematically examine the possible determinants of intrinsic motivation. In this report we are specifically concerned with the topic of feedback. The basic argument is that feedback appears to have very good prospects for increasing productivity.

The use of feedback has generally been based on a number of reasonable assumptions about the motivational, learning, and reward properties of feedback (Ammons, 1956; Annett, 1969; Thorndike, 1927).

In addition, many different types of feedback have been explored. Probably the most popular variation of feedback has concerned immediate versus delayed feedback (Beeson, 1973; Christian, 1972; Robinson & Kulp, 1970; Sassenrath & Yonge, 1969). Another frequent type of feedback used is right vs. wrong responses or some combination of right and wrong (Longstreth, 1970; Merrill. 1970; Wike, 1970). Other common variations of type of feedback are verbal vs. nonverbal (Lair & Smith, 1970; Simpson, 1972); personal vs. impersonal (Weidner, 1968); accurate vs. inaccurate (Griswold, 1970); information content (Berman, Fraser, & Theios, 1970) and frequency (Ivancevich et al., 1970).

However, even though there are a large number of these studies, it is very difficult to draw any real practical implications from them. The reason for this is a lack of a systematic research effort. Investigators pick two or three specific types of feedback with little regard to the underlying feedback dimensions they are tapping. What is needed is a systematic approach wherein a taxonomy of feedback dimensions is generated, and studies are conducted to explore these dimensions singly and in combination.

One attempt in this direction has been that of Greller and Herold (Note 1). They genrated four categories of feedback: expression, consequences (both from the supervisor), task feedback and comparisons. In another study by Greller (Note 2), he generated five factors: positive from above, positive from peers and other sources, negative, self-generated from work flow, and self-generated internally.

Although this work is in the right direction, it seems that these dimensions represent a limited view of possible types of feedback. In order to expand this list, the present researchers examined the available literature and combined with logical analysis developed a more extensive list of feedback dimensions. The result of this effort is a list of 14 dimensions that appears to cover most of the possible variations that can have relevance in a feedback situation. While it is acknowledged that in some instances there is overlap between (or among) dimensions, it is felt that each has its own key elements and should be defined separately.

Feedback Dimensions

1. *Positive vs. Negative*. This dimension has three permutations: positive alone, negative alone, or positive and negative presented together. This type of feedback deals directly with the correctness of the behavior of interest. If the behavior is correct, positive feedback is given. If it is incorrect, negative feedback is given. If we are dealing with positive-alone or negative-alone, then feedback speaks only to correct or incorrect behavior, not both.

2. *Timing of Feedback*. This dimension refers to the time that elapses between the performance of a task and the presentation of feedback. This elapsed time might vary from a long span of months or years to a situation where feedback is available during and/or immediately after performance.

3. *Specificity*. Variation along this dimension concerns the molecularity of the behaviors on which the feedback is given. The extremes of specificity would range from a single evaluation of a person's total role to feedback on the smallest task relevant act in which the person engages. Other meaningful points along this continuum might be various subproducts or major products the individual produces.

4. *Evaluative – Nonevaluative*. Evaluative feedback is feedback given by some powerful other in the organization and clearly implies that the powerful other has evaluated the performance of the person. Nonevaluative feedback does not include this formalized evaluation by another person. Nonevaluative feedback typically would come from mechanical sources that do not involve another person.

5. *Absolute – Comparative*. Absolute feedback is information only about a person's own performance. Under comparative conditions individuals would know their own performance, as well as how this level of performance compares with reference to some other group, such as his own work group.

6. *Internal – External*. External feedback is that which comes from a source external to the performer. This source could be another person or some mechanical device (e.g., a counter). Internal feedback refers to information which is based on the person's own experience with the task. Proprioceptive or kinesthetic feedback would be internal types of feedback.

7. *Personal – Impersonal*. This dimension is concerned with the level of personal contact between the performance and the source of feedback. Face to face oral feedback from one's supervisor would be highly personal while a self-obtained computer printout outlining performance would be highly impersonal.

8. *Power of Source*. Power here is defined in terms of the source's ability to control the individual's rewards. A high power source would control pay raises, promotion, or social rewards. A low power source, conversely, would control no rewards.

9. *Schedule of Feedback*. This dimension basically reflects the reinforcement schedule of the feedback. Examples would include continuous (after every response), fixed interval (weekly, yearly) and variable interval (at different points around some average length of time).

10. *Degree of relevance to individual performance*. This dimension concerns whether the feedback presented deals with the individual alone or his entire work group. For example, information about the progress of a given group project may tell the individual very little about his own behavior.

11. *Comprehensiveness*. This dimension is defined as the percentage of the role covered by the feedback. If the feedback dealt with only one aspect of a complex job, it would be low in comprehensiveness.

12. *Formal – Informal*. Feedback along this dimension concerns whether the individual has an expectation of receiving feedback prior to the feedback encounter. An annual performance appraisal interview would be an example of formal feedback. Informal feedback is more random in nature and would not be actually expected prior to the encounter.

13. *Public -- Private*. This dimension refers to whether feedback is given to the individual alone or in the presence of others. These others would most generally be members of the individual's work group.

14. *Accuracy*. Accuracy refers to the validity of the information. That is, the extent to which the information given to the person validly reflects the true state or nature of his performance.

We argued previously that one of the problems with the available feedback research was that it lacked a realistic taxonomy to guide the research effort. With the above taxonomy, we should be able to more effectively explore the feedback process so that practical suggestions for enhancing productivity in field situations can be made. However, there is another issue that must also be considered. This is the questions of why feedback has an effect on performance. Our position is that to effectively select the best type of feedback for a particular setting we must know why the feedback is having the effects it does. With this information we can make much more informed choices about which type of feedback to use.

With this argument in mind, we can postulate several mechanisms which might explain why feedback works. One of these mechanisms is through *role perceptions*. To effectively perform, a person must know what is expected of him. This means which types of tasks and activities he should be doing, the relative importance of each, and the expected level of performance or production on each. Feedback may serve to make these role perceptions more accurate and thus enhance the effectiveness of the person.

Feedback may also have effects on behavior through *reinforcement principles*. If one takes a position such as that advocated by expectancy theories of motivation (c.f., Campbell & Pritchard, 1976) several possible explanatory mechanisms emerge. In its most basic form, expectancy theory suggests that three major variables are involved. *Effort-performance expectancy* is the perceived relationship between a person's effort and his performance. It reflects the degree to which a person feels that changing his level of effort will have some real impact on his level of performance. *Performance-outcomes instrumentality* is the perceived relationship between a person's level of performance and his outcomes or rewards. If high, it means that rewards are tied to performance, and the level of performance will determine the level of reward. If low, it means that rewards are unrelated to performance. The third variable, *valence of outcomes* is the attractiveness or value the person places on the outcomes or rewards available.

According to expectancy theory, all three of these variables must be at high values for motivation to be high. That is, a person must feel he can influence his performance by his effort, he must see that high performance leads to high rewards, and he must value the rewards.

Feedback, at least in principle, can influence all three of these variables that influence motivation. It could increase effort-performance expectancy by clarifying a person's actual performance. If a person does not know how well he is performing, it would seem very difficult for a high effort-performance expectancy to be present. Performance-outcome instrumentalities could be affected by feedback in that the reward aspects of feedback could increase instrumentalities between performance and such outcomes as recognition and feelings of accomplishment since the person may not be accurately aware of how his performance is being evaluated. Valence of outcomes could change since outcomes such as recognition could be added by feedback.

A third mechanism by which feedback could influence performance is through *goal setting*. With good performance feedback a person may be more likely to set goals for himself. The potential power of goal setting as a mechanism for increased performance has been well established (Locke & Bryan, 1968).

Finally, feedback may have a direct effect on intrinsic motivation. This is a position that is roughly consistent with the Hackman and Oldham (19. 5) position on increasing intrinsic motivation on a task. We could argue that feedback makes the task more interesting and involving, and thus increases intrinsic satisfaction. If the task is more intrinsically satisfying, performance could be affected.

The Study

With this background in mind, the purpose of the present study was to experimentally manipulate two of the dimensions of feedback presented in the taxonomy, and assess their effects on performance, as well as satisfaction. The two dimensions selected for this study were Specificity of Feedback and Absolute vs. Comparative Feedback. The predictions were that feedback would result in performance superior to no feedback; specific feedback should be superior to nonspecific feedback; and comparative feedback should be superior to absolute feedback.

The rationale for the predictions within feedback types is based on the idea of available information. Specific feedback gives more information than nonspecific feedback, and comparative feedback gives more than absolute.

In addition, the study explored some of the possible mechanisms postulated to explain why feedback affects performance.

II. METHOD

Overview

Subjects were hired for what they felt was a real job of six days duration. The subjects were recruited from the local area in an attempt to obtain a sample that was basically comparable to the Air Force population. The task was selected to be quite similar to tasks actually done in some AFSCs. Specifically, it consisted of an inventory control task wherein subjects processed purchase requisitions. It was designed to be highly realistic, and representative of the way the work would actually be done.

After learning to do the task, subjects worked for one day with no feedback. After the no feedback day, subjects were treated differently. One small group of subjects (N = 5) continued to work for the remaining four days without any feedback. This constituted a control group. The remainder of the subjects received formalized feedback after the no feedback day. Two feedback dimensions were manipulated. The first was feedback specificity. In one condition, subjects were given nonspecific Feedback in that they were only told the number of orders processed and the number of orders with one or more errors. In the Specific Feedback condition, they were given the above information plus a listing of the various types of errors that could be made, and how many of each they actually made.

The second feedback dimension manipulated was Absolute Feedback vs. Comparative Feedback. In the Absolute Feedback condition, subjects were given information about their own performance. In the Comparative Feedback condition they were given information about their own performance, as well as the performance of their co-workers in the form of a frequency distribution.

The study was set up so that after the no feedback day, one group (N = 13) received Nonspecific Feedback in an Absolute format. After two days of this type of feedback they were switched to Nonspecific Feedback in a Comparative format. They worked under this feedback combination for the last two days. The final group (N = 13) received Specific Feedback in an Absolute format after the no feedback day, and worked under this feedback system for two days. They were then switched to Specific Feedback in a comparative format for the last two days. The complete design is listed schematically in Figure 1.

Subjects

The subjects used in this project were recruited using a job advertisement in the local newspaper. The only information they were given prior to reporting for the job was that this was a short-term clerical job

Group	Time (Day)					
	1	2	3	4	5	6
1	Introduction	Practice	No Feedback	No Feedback	No Feedback	No Feedback
2	Introduction	Practice	Nonspecific Absolute Feedback	Nonspecific Absolute Feedback	Nonspecific Comparative Feedback	Nonspecific Comparative Feedback
3	Introduction	Practice	Specific Absolute Feedback	Specific Absolute Feedback	Specific Comparative Feedback	Specific Comparative Feedback

Figure 1. **Schematic representation of the experimental design.**

with Purdue University and that no special skills were required. Subjects were paid $2.15 per hour. The sample had 14 men and 17 women and the age range was from 17 to 54. The mean age was 22.1 years of age; the median was 19.

Experimental Task

The task was designed to resemble a real inventory control job. Subjects were given a stack of purchase requisitions to process. The essential portion of these forms indicated the requisitor's user code, and the items being requested. Each item was entered with its identification number, its name, and the number of units ordered. (See Appendix A for a sample purchase requisition.) The number of items on a purchase requisition varied from 4 to 6, and averaged 5. In order to equate difficulty, the orders were arranged so that within each set of six purchase requisitions, the mean number of items was exactly 5.

Subjects were also given a computer printout of the items contained in Purdue's General Stores. This printout contained approximately 2,000 items. The printout contained a variety of pieces of information including the item identification number; the item name; the number of units of that item currently in stock; the reorder point; and the number of units to be ordered when an order was made. The minimum re-order point referred to the number of units in stock below which an order for more units should be made by Purdue General Stores to their supplier. In other words, when the inventory in stock fell below that point, the item should be ordered to replenish the depleted stock. The number of units to be ordered referred to the number of units Purdue General Stores would order from their suppliers when an order was made. (A sample of this computer output is presented in Appendix B.)

In performing the task, the subject first examined the "user code" which appeared on a purchase requisition and then consulted a list of "authorized user codes." The subject had to acertain whether this user (i.e., user number) was authorized to order from the General Stores. If the user code number was not on the "approved" list, the subject so indicated, but completed the requisition. Subjects were told that an accounting adjustment had to be made for these accounts and that was the reason for checking the number. An unauthorized account number appeared relatively infrequently, averaging 1 time out of every set of 10 purchase requisitions.

The subject then went to the items ordered on the purchase requisition. He first found the ordered item in the printout and determined whether there were enough units in stock to fill the order. If there were enough in stock, he placed a check mark by that item on the purchase requisition and deducted the amount ordered from the number of units in stock and wrote this new balance on the purchase requisition. He then checked to see whether this new amount in stock fell below the minimum reorder point, shown on the printout. If it did not, he went on to the next item.

If the new balance fell below the minimum reorder point the subject filled out a "reorder form" (See Appendix C for a copy of this form), and ordered the quantity labeled "reorder quantity" in the printout.

If the new balance actually fell below zero, the subject completed an "out of stock form" (See Appendix D for a copy of this form), as well as a reorder form. On the out of stock form subjects had to indicate the amount ordered, the amount shipped, and the amount backordered.

In order to equate task difficulty, there were a specific number of each of these contingencies in each set of 30 items (i.e., 6 purchase requisitions). Specifically, out of every 30 items, 8 required that a reorder form (Purchase Order) be completed for 4 of these 8, the subject would have to complete an out of stock form.

Although the forms and procedures were designed or selected specifically for this research and the materials were selected to have maximum realism and face validity, the orders themselves were not actually real.

Procedures

Subjects reported to the on-campus work site and were met by two experimenters. Subjects were then told that the experimenters were working in conjunction with the purchasing department at Purdue on an investigation of a new method of inventory control for the university's General Stores' function. They were then told that the job would last six days, and that they would work three hours each day. They were told that they would be given a short test to see how well they could do the job. The test used was the Short Employment Test for clerical ability (Bennet & Gelink, 1951) and was to be used as an ability measure. The experimenters then glanced over these tests and indicated that there didn't seem to be any problems with anyone's score and implied that the test was basically a formality.

The experimenters then proceeded with the training for the task. The entire first session was used for training purposes. This was to insure that everyone completely understood the job. At the beginning of the second day a complete review was given. Subjects then worked on the task for the remainder of the session.

Starting with the third day, the three experimental groups were treated differently. For the control group, they merely reported to work each day, and worked on the task without feedback. The other two groups did receive feedback as indicated in the Overview. Specifically, before the start of the third day, the work done by the two feedback groups on the previous day was scored. The number of purchase requisitions completed was counted, and the number of errors made was determined. There were eight types of errors possible. They were: (a) incorrect determination of authorized user number, (b) incorrect location of an item in stock, (c) incorrect deduction from stock, (d) failure to indicate on the purchase requisition that a back order should be made, (e) failure to place a reorder when the stock level for an item fell below the reorder point, (f) an error in completing the reorder form, (g) failure to send an out of stock form, and (h) an error in completing the out of stock form.

In those cases where errors were dependent on each other, the subject was assessed only one error. For example, if he failed to do a reorder, he was charged with a failure to place a reorder, but he was not chared with a reorder incorrect error.

At the start of the third day, subjects in the two feedback groups reviewed their feedback for the previous day's work. In the Nonspecific condition they were given sheets (Appendix E) indicating the number of purchase requisitions completed during the day and the number and percent of purchase requisitions which had one or more errors. In the Specific Feedback condition they were given the above information, but also an indication of how many of each of the eight types of errors they had made (Appendix F).

Both of these conditions were in the Absolute Feedback format. That is, they received data on only their own performance. This procedure was repeated on the fourth day. That is, subjects got either Specific or Nonspecific Feedback in an Absolute format for their performance on the previous day.

At the beginning of the fifth day, the Comparative condition was instituted for both groups. The two groups, Specific and Nonspecific Feedback, received the same type of data as before, but they were also

given frequency distributions of number completed and errors made by the other members of the group. Thus, they were able to see their relative standing in comparison to the other workers. (See Appendices G and H for sample forms.) This feedback procedure was repeated for the last day. In addition to these procedures, a questionnaire was administered three times during the course of the six days. The first administration was at the end of day two, the first performance day. The second administration was day four, the second day of the absolute condition. The third administration was on the sixth day, the second day of the comparative condition.

The first section of the questionnaire (Appendix I) contained 12 items from the Minnesota Satisfaction Questionnaire (Weiss, Dawis, England, & Loftquist, 1967). The next section contained a 25-item questionnaire, termed the Task Reactions Questionnaire, adopted from Mayo (1976). This instrument was designed to measure intrinsic satisfaction on a task and has shown very good psychometric qualities (Appendix J). The next section (Appendix K) was the Job Descriptive Survey (Hackman & Oldham, 1975). The next section dealt with role perceptions (Appendix L). Subjects were asked to indicate the relative importance of speed versus accuracy, and asked to indicate the likelihood of making each of the different types of errors. The last section (Appendix M) assessed effort-performance – reward instrumentalities, and valences for eight work outcomes.

III. RESULTS

The results of the study will be presented in four major sections: Preliminary Analyses, Overall Results, Results by Condition, and Secondary Analyses.

Preliminary Analyses

The first preliminary analysis was to determine if there were any differences in ability between the three groups of subjects. Any such ability differences would have to be taken into consideration in interpreting performance results between conditions. To assess any ability differences, the clerical aptitude data were analyzed. Mean score for the Specific condition was 26.54; for the Nonspecific condition, 31.00; and for the control condition, 31.00. Respective standard deviations were 11.17, 5.13, and 9.17. The most conservative test for ability differences is to compare the Specific with the Nonspecific conditions. This results in a t-value of 1.31, which is nonsignificant. Thus, there is no evidence to suggest the groups differed in ability, and subsequent analyses may be interpreted without considering possible ability effects.

The next preliminary analysis is essentially a manipulation check. The issue here is whether the subjects under feedback conditions actually perceived that they were receiving more feedback than under the no feedback conditions. To assess this, the three items from the Job Descriptive Survey dealing with the degree of performance feedback present on the job (see Items 7, 10, and 12 in Appendix K) were summed, with reverse scoring done where appropriate. The means for these items are presented in Figure 2. These means clearly support the success of the manipulations in that for the Specific and Nonspecific treatment groups, perceived feedback increased sharply when the feedback manipulations occurred. Furthermore, the Control condition, which received no formal feedback, showed an actual decrease in perceived feedback. This difference is highly significant in that an *a priori* contrast comparing the means under no feedback with the means under feedback for the Specific and Nonspecific conditions was highly significant ($p < .001$). Thus, the manipulations were highly successful.

The last set of preliminary analyses deals with the question of whether the subjects had reached asymptote in their performance. Recall that the design called for subjects to learn the task on the first day, and work on the task with no feedback on the second day. After the second day the feedback conditions were instituted. With this design, performance during the second day would serve as a baseline with which to compare performance under the feedback conditions. However, for this to be possible, subjects had to have learned how to do the task sufficiently well so as not to be improving their performance simply due to learning. If subjects were improving their performance due to learning into the second or third day, any observed increases in performance could be due either to learning or to the treatment effects, and it would not be possible to tell which.

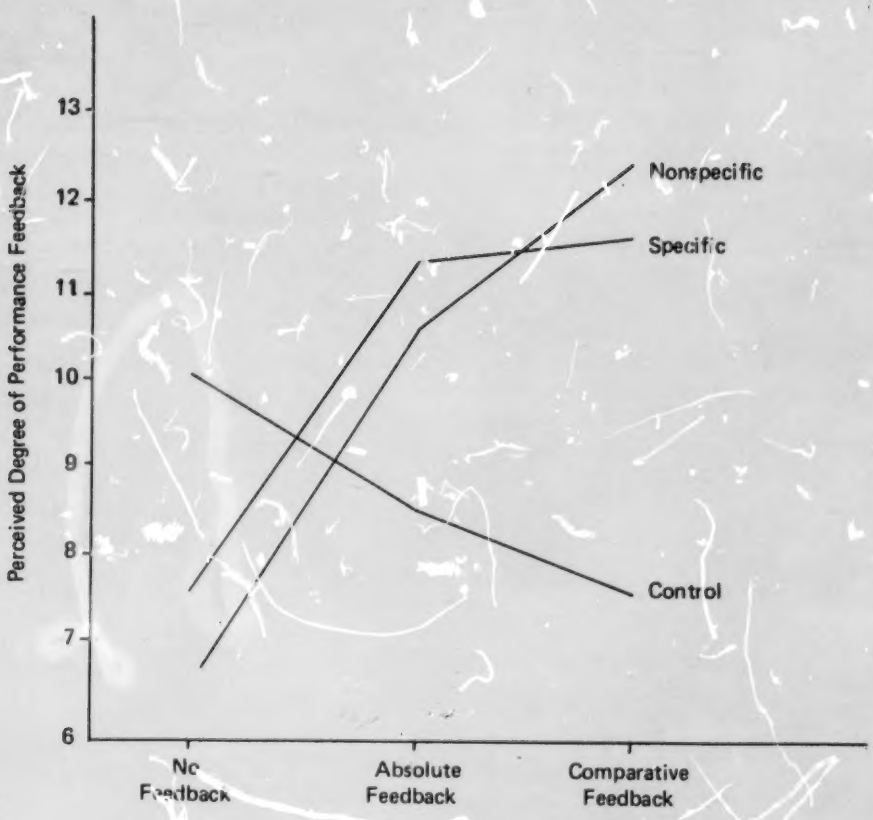

Figure 2. **Perceived degree of performance feedback, by condition.**

In order to insure that this was not a problem, data were collected in a pilot study to determine when subjects' performance actually did asymptote. These data indicated that by the start of the second day, after the first day's practice, subjects' performance was not increasing. However, it was felt worthwhile to assess this directly in the actual study. To do this, the work completed by the subjects was collected at the end of each 45-minute period on the second day. The argument is that if performance increases throughout the day, this would be evidence that learning was still occurring.

Two dependent variables are appropriate here: number of orders processed and total errors across all subjects. (Recall that all subjects had been treated identically up to this point.) The mean number of orders processed for the first, second, and third 45-minute periods were 9.9, 8.7, and 9.1, respectively. Analogous total error means were 4.5, 3.7, and 4.1.

These means suggest that learning was not still taking place. For the number of orders finished, subjects actually decreased their performance from the first session. For the error data, although the frequency of errors decreased from the first period to the second, they increased again for the third session. Thus, there is no evidence to suggest that subjects were learning to do the task better throughout the day.

As a final check, the data from the control condition were examined across days. The argument was that if subjects were still learning the task, performance during the first day would be lower than for the last four days. In fact, mean number of orders finished by the control group for the first day was 27.6, and for the last four days was 29.3. Analogous means for the error data were 16.6 and 21.1, respectively. Although neither of these differences is significant, they suggest that while number of orders finished by

the control group went up slightly, the error rate went up as well. Thus, it appears they may have been working faster after the first day, but less carefully. Thus, these data do not suggest that any real learning was taking place after the first day.

Taking the time period data and the control group data together, it seems fairly evident that performance during the first real working day can serve as an appropriate baseline with which to compare the feedback conditions.

Overall Results

Before turning to a presentation of the results by specific feedback condition, it is worthwhile to evaluate the overall effects of the feedback. That is, without considering the specific types of feedback that were used in this study, what was the overall effect of the feedback? These effects will be presented in terms of three dependent variables: numbers of orders finished, total errors, and job satisfaction. To make these comparisons, the data from the two major conditions (N = 13 in each) will be considered. Means will be presented for these subjects under conditions of no feedback, and under conditions of feedback, regardless of which of the four specific types of feedback that were used.

In terms of the number of orders processed, under conditions of no feedback the two groups finished 27.83 orders per day. Under conditions of feedback the mean was 30.24. This reflects a 9% increase in performance. In terms of error data, the mean number of errors made per day without feedback was 11.70; and with feedback 8.30. This reflects a 29% decrease in the number of errors made. The mean total satisfaction under no feedback was 43.48; and under feedback was 39.35. Although percentages are not really appropriate with these satisfaction data, as a point of comparison this reflects a decrease in satisfaction scores of 9%.

Overall, then, the results suggest that feedback had a positive effect on productivity in that the amount of work finished increased and the frequency of errors decreased. However, feedback had the general effect of decreasing satisfaction.

Results by Condition

With these overall results in mind we shall now turn to the results by feedback condition. As before, the three variables of concern are number of orders processed, number of errors made, and job satisfaction.

Mean for the number of orders finished by condition are presented in Figure 3. In these and subsequent analyses, the conditions to be considered are the two primary feedback groups. That is, the control group will not be considered further. There are several reasons for this. First, the control group had a sample size of only 5, and thus, these means are rather unstable. The more important reason, however, is that the control group was included in the design to use as a baseline in the event that the subjects had not reached asymptote by the first performance day. Since the data clearly inidicate that subjects were not improving their performance during the first real working day, the control group becomes unnecessary.

Thus, the appropriate analysis is a 3 by 2 crossed design with the No Feedback – Absolute Feedback – Comparative Feedback treatments as the repeated factor and the Specific – Nonspecific treatments as the between factor.

The overall ANOVA for the mean number of orders finished data indicates no main effect for specificity, ($p > .50$), but strong effects for the No Feedback – Absolute – Comparative main effect ($p < .001$) and the interaction ($p < .001$). Examination of the means in Figure 3 indicates that there was no change in performance when specific performance feedback was used in either an absolute format or a comparative format. However, when the feedback was nonspecific, large increases were observed. Based on contrasts of the means, nonspecific absolute feedback was superior to No Feedback ($p < .01$), and Nonspecific Comparative Feedback was superior to Nonspecific Absolute Feedback ($p < .01$).

Figure 4 presents the error data. While none of the overall effects from the ANOVA are significant for these data, the pattern of means suggests that subjects in the Nonspecific conditions made fewer errors under feedback than without feedback. Since this was predicted, it was tested directly even though no

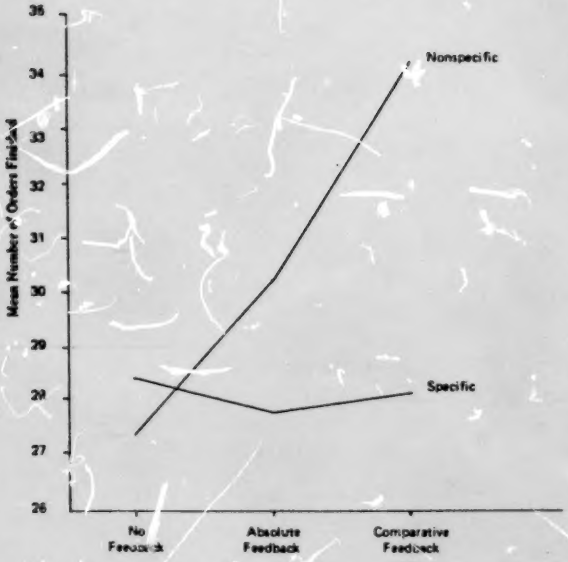

Figure 3. **Mean number of orders finished by condition.**

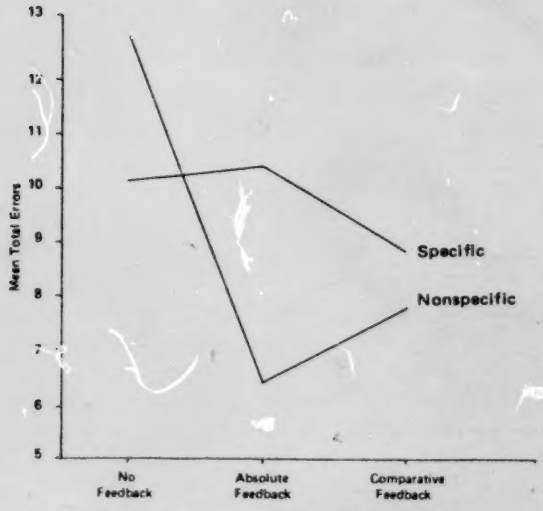

Figure 4. **Mean total errors, by condition.**

overall effects were obtained. The mean errors under No Feedback was 12.69 for this Nonspecific group, and the mean number of errors under the two feedback conditions was 7.13. This difference is significant ($p < .01$).

The data on overall job satisfaction are presented in Figure 5. The ANOVA indicates a single significant effect, that being a main effect for the No Feedback – Absolute Feedback – Comparative Feedback treatment dimensions ($p < .01$). The pattern of means indicates that overall satisfaction decreased with the addition of feedback. Although the effect is more pronounced for the Specific feedback groups, the decrease for the Nonspecific groups is also significant as indicated by a *post hoc* contrast ($p < .01$).

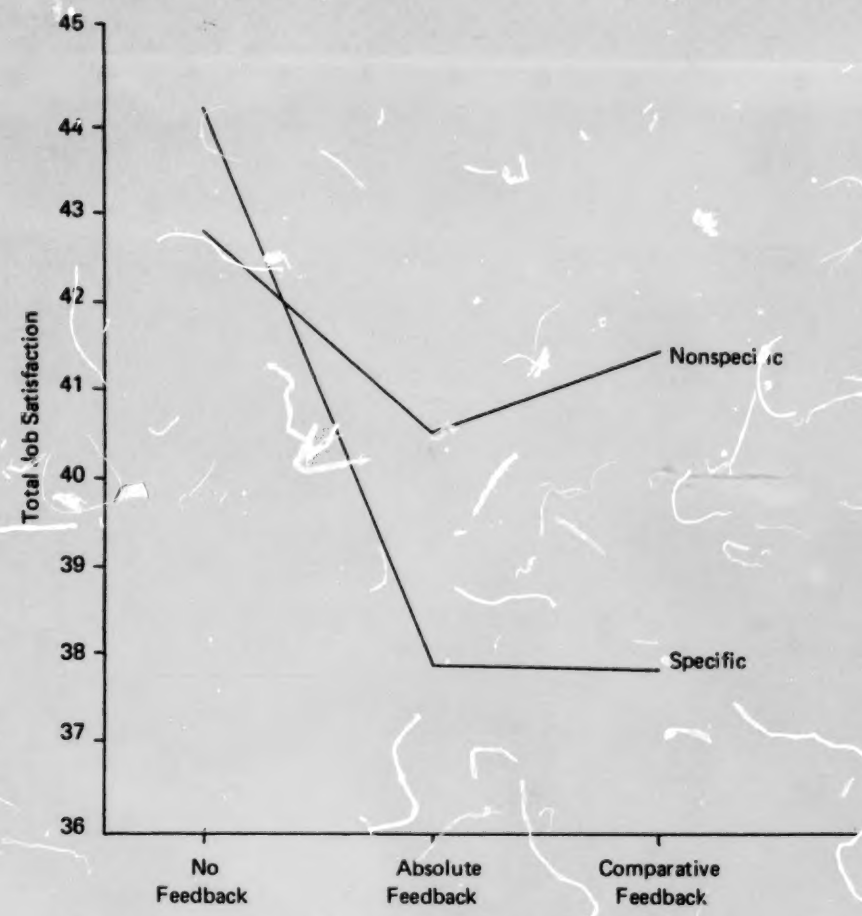

Figure 5. **Total job satisfaction, by condition.**

Secondary Analyses

With the overall results and results by condition having been discussed, we now turn to the analyses that attempt to shed some light on the reasons why the feedback had the effects it did. Specifically, in the introduction we presented several mechanisms that might explain feedback effects. These included issues of role perceptions, components of the expectancy-valence model, and intrinsic motivation. The cell means and p-values for the three ANOVA effects are presented for these variables in Table 1.

Two types of role perceptions questions were used. The first, and probably most important, was the importance of speed vs. accuracy in the work. No significant effects were observed for this variable, although there was a tendency for the subjects in the Nonspecific Feedback conditions to see accuracy as more important than the subjects in the Specific Feedback conditions.

The second role perception analysis was done on the data dealing with difficulty of making an error. Recall that subjects were asked how easy they felt it was to make an error on each of the types of errors possible. Responses to these questions were summed across the errors, and these means are presented in the table. The analysis indicated a strong No Feedback – Absolute Feedback – Comparative Feedback effect. The means suggest that after receiving feedback, subjects in both conditions perceived it was more *unlikely*

Table 1. **Means and P-Values for Secondary Analyses**

Variable	Specific Feedback			Nonspecific Feedback			Specificity Effect (A)	ABS-Com. Effect (B)	A X B
	No	ABS	COM	No	ABS	COM			
1. Role Perceptions									
A. Speed vs. Accuracy[a]	3.6	3.5	3.1	3.9	4.0	3.8	.08	.78	.59
B. Probability of making an error[b]	12.5	10.5	12.9	11.9	9.6	12.3	.53	.0001	.95
2. Expectancy-Valence									
A. Effort-performance expectancy	.72	.91	.55	.08	−.08	.67	.82	.25	.63
B. Instrumentality									
(1) Making a lot of money	.09	.00	.00	.00	.00	.17	.70	.58	.27
(2) Feeling a sense of accomplishment	1.00	1.36	1.18	1.67	1.58	1.67	.28	.85	.68
(3) Thought of as good worker by superior	1.27	.45	1.00	1.17	1.00	1.08	.64	.12	.37
(4) Feeling nervous and anxious	−.64	−.18	−.18	−.50	−.83	−.83	.51	.96	.20
(5) Feeling of self-confidence	1.45	1.27	1.18	1.75	1.58	1.66	.66	.24	.68
(6) Enjoying doing the task	.73	.63	.91	1.25	1.17	1.00	.55	.89	.59
(7) Make use of my abilities	.45	.55	.27	1.08	1.00	.92	.09	.53	.81
(8) Use my own methods for doing the task	.45	.27	.27	.33	.42	.58	.72	.84	.31
C. Valence									
(1) Making a lot of money	2.55	2.18	2.27	2.17	2.08	1.83	.53	.22	.60
(2) Feeling a sense of accomplishment	2.18	1.64	1.64	2.25	2.25	2.25	.23	.31	.31
(3) Thought of as good worker by superior	1.64	1.09	1.36	2.25	1.58	1.75	.19	.02	.86
(4) Feeling nervous and anxious	−1.45	−1.55	−1.91	−2.67	−2.75	−2.84	.04	.29	.72
(5) Feeling of self-confidence	1.91	1.45	1.73	2.50	2.25	2.25	.07	.11	.69
(6) Enjoying doing the task	2.45	1.36	1.55	2.25	1.83	2.33	.56	.01	.12
(7) Make use of my abilities	2.09	1.64	1.45	2.25	1.58	2.33	.57	.11	.18
(8) Use my own methods for doing the task	2.27	1.36	1.63	1.83	1.33	2.33	.84	.03	.14
3. Task Reaction Questionnaire (intrinsic motivation)	112.30	91.30	90.60	109.10	99.90	95.80	.76	.0001	.25
4. Equity	8.18	7.55	8.36	10.17	9.92	9.42	.02	.52	.23

[a]The higher the mean, the more accuracy is seen as being important.

[b]The higher the mean, the more easy it is seen to make an error.

that errors would be made. However, after Comparative Feedback, their perceived likelihood of making errors increased again, approximately to their original level.

The expectancy-valence data are also presented in the table. For effort-performance expectancy, no significant effects were observed. Likewise, no effects were observed for the instrumentality data. It is particularly noteworthy that none of the intrinsically oriented items (Items 2, 5, 6, 7, and 8) showed effects.

The valence data did show some effects. For both the Specific and Nonspecific groups, there was a tendency to consider "being thought of as a good worker by my supervisor" as being less desirable after the feedback was instituted. The Nonspecific Feedback group felt that "feeling nervous and anxious at the end of the day" was more aversive than did the Specific Feedback group. However, this difference is largely uninterpretable since the difference was present under the no feedback condition when both groups were treated identically. The desirability of "enjoying doing the task" generally decreased after feedback was instituted. However, the effect appears to be stronger for the Specific Feedback subjects. Finally, there was a tendency for the subjects to perceive a decrease in the desirability of "using my own methods of doing the task" after feedback was instituted. Again, however, the effect appears to be stronger for the Specific Feedback condition.

The Task Reaction Questionnaire, our measure of intrinsic satisfaction showed one strong effect in that, contrary to the predictions, after feedback was instituted the intrinsic motivation decreased substantially.

Summary of the Results

1. Overall, feedback had a positive effect on productivity in that the number of units finished increased and the frequency of errors decreased.

2. Almost all of the increase in productivity, both in terms of quantity and quality, is attributable to the Nonspecific Feedback conditions. There was no change in quantity or quality for subjects under Specific Feedback.

3. Within the Nonspecific group, Comparative Feedback was superior to Absolute Feedback in that quantity of performance was higher under Comparative Feedback, and errors were essentially the same.

4. Using performance feedback resulted in a decrease in overall job satisfaction. While the effect was not as strong for the Nonspecific Feedback as it was for the Specific Feedback, both groups showed a decrease. Using Absolute or Comparative Feedback did not result in any difference in job satisfaction.

5. The attempts to isolate the causes for changes in productivity as a result of feedback were largely unsuccessful. None of the major types of explanatory variables showed clear effects that could be used to explain the results.

IV. DISCUSSION

The two feedback dimensions explored in this research were specificity of feedback and absolute vs. comparative feedback. The results clearly indicate that the nonspecific feedback had strong, positive effects on productivity. Compared to the no-feedback conditions, nonspecific feedback resulted in an increase in work done of 18%, and a decrease in errors made of 44%. These are strong results indeed, and clearly suggest that performance feedback can have a very strong effect on productivity.

Contrary to prediction, however, specific feedback did not show any real effects on productivity. It was expected that the more specific feedback would show subjects where they were making errors, and thus enable them to change their behavior to more directly eliminate these errors. This effect did not materialize. Two explanations seem possible to account for these findings. One is that the specific feedback somehow resulted in information overload. That is, there was so much information about performance that

subjects were not able to really deal with all of it. To the extent that this explanation is valid, it suggests that feedback systems must be designed so that workers do not get more performance information than they can actually use.

A second possible explanation deals with the question of involvement. On a short-term job such as this, it is unlikely that the subjects were as involved with the task as they might have been on a permanent job. In such a situation, simple performance feedback, as in the nonspecific feedback condition, may have been quite relevant, but when more detailed feedback was presented, the subjects were not involved enough with the task to really attend to it. This argument suggests that the specificity of the feedback should be a function of the level of involvement of the workers. As involvement is higher, the specificity of the feedback could be greater. The testable proposition that this implies is that productivity will be maximized when the level of specificity of the performance feedback is based on the level of involvement of the workers.

Absolute vs. comparative was the other feedback dimension. Overall, the results indicate that comparative feedback is generally superior to absolute feedback in terms of productivity. However, this must be qualified somewhat. When comparative feedback was used in conjunction with nonspecific feedback, productivity was enhanced. However, no effects were observed when it was coupled with specific feedback. One interpretation of these results is that the specific – nonspecific dimension is somehow more powerful than the absolute-comparative. That is, when feedback was specific, no effects emerged whether the specific feedback was given in an absolute or a comparative format. However, when feedback was nonspecific, differences in absolute and comparative feedback did emerge, with the comparative resulting in superior productivity.

One possible explanation of these results is suggested by the data in the perceived amount of feedback. (Figure 2, discussed previously in the context of a manipulation check.) These data indicate that when comparative feedback was used with the nonspecific group, the perceived degree of feedback increased ($p < .05$) over the condition when absolute feedback was used. There was no increase in perceived feedback with the specific group. This suggests that the nonspecific group saw the change from absolute to comparative feedback as an increase in the total amount of feedback, but that subjects in the specific group did not see it as more feedback. Possibly the inforamtion overload argument is relevant here in that the specific group already had too much information. In any event, it seems likely that the subjects in the specific condition simply did not see the comparative feedback as adding more information, while the subjects in the nonspecific condition did see it as adding more information.

One unexpected finding of some significance is the decrease in job satisfaction that occurred when feedback was initiated. While the decrease in satisfaction was strong for the specific feedback group, it was still significant for the nonspecific group. One explanation for this decrease is that the subjects were simply getting bored with the task, and this decrease would have occurred regardless of whether feedback was instituted or not. However, data from the control group do not support this argument. This group showed no decrease whatsoever in job satisfaction over the course of the work period.

Another explanation is that somehow the presentation of performance data represented a threat to self-esteem. That is, the feedback was seen as telling the subjects that their work was inadequate. Another possibility was that the feedback somehow was perceived as increasing the pressure to perform more effectively on the task and this pressure was seen as aversive.

One interesting question that is raised by this decrease in satisfaction is whether the decrease was a function of the actual performance of the subject. That is, did poor performing subjects decrease their satisfaction after receiving feedback of poor performance while the higher performing subjects decreased their satisfaction less or not at all? To assess this, correlations between performance and satisfaction were examined. If this argument is valid, the correlation between satisfaction and number of units produced under feedback conditions should be positive, and the correlation between satisfaction and error should be negative. The median correlation across the four feedback conditions between units produced and total satisfaction was –.02. The analogous correlation for the error data was .48. Thus, there is no evidence that the higher performing subjects were relatively more satisfied than the lower performing subjects.

The results of the attempts to explain why feedback had its effects were generally negative. None of the explanations explored showed any real ability to explain the findings. Of particular interest was the fact that the data indicated that intrinsic satisfaction actually decreased when feedback was instituted. This was not generally true of the control group in that while they showed some decrease in intrinsic motivation by the last day, they showed no decrease over the first two administrations. In contrast, the two feedback groups showed a decrease by the second administration; that is, as soon as the feedback was initiated. Thus, somehow the feedback itself appeared to be accounting for the decrease.

This finding is in contrast to most approaches to intrinsic motivation (e.g., Hackman & Oldham, 1975) which suggest that feedback should increase intrinsic motivation.

The question remains, however, that since intrinsic motivation actually decreased and the other explanatory mechanics showed no real effects, how do we explain the fact that the feedback, at least for two of the conditions, resulted in such strong positive effects on productivity? Several explanations seem possible. First, giving feedback may have seemed to increase the subject's perception of what constituted satisfactory performance. That is, the process of giving feedback may have been interpreted as indicating that performance was not satisfactory and that it should be improved. Second, giving feedback may have increased the salience of producitivity. That is, it may have indicated that the "organization" was very concerned with their performance, and that they would be held accountable for their performance. Finally, giving feedback may have resulted in goal setting on the part of the subjects. This was a mechanism postulated in the introduction to this report, but due to the repeated measures nature of the design it was felt that the actual process of asking goal setting questions early in the design might bias the goal setting behaviors of the subjects. However, it is possible that subjects who received feedback did tend to set performance goals and this goal setting influenced productivity.

Which of these mechanisms, if any, will actually explain why the giving of feedback has the effect it does in productivity remains a question for future research. However, it seems clear that performance feedback can have strong positive effects on productivity, even if we are unable to isolate the specific reasons why it does.

V. IMPLICATIONS

The major purpose of this line of research is to ultimately be able to take the findings into an Air Force field setting and evaluate their effectiveness in such a field setting. At this point in the research program we are attempting to isolate the most effective strategies for feedback administration in a less complex, more highly controlled environment. Once these strategies are isolated and defined, they will be subjected to field tests. With this goal in mind, the following implications emerge from this research.

1. Increasing performance feedback has the potential for substantial enhancement of productivity in field settings.

2. Nonspecific feedback appears to be superior to specific feedback. However, specific feedback should be investigated in a situation in which involvement with the job is higher.

3. Comparative feedback shows promise as being superior to absolute feedback.

4. Increasing performance feedback may result in a decrease in job satisfaction. This possibility should be carefully explored.

5. Different types of feedback appear to have markedly different effects on productivity. These differences should be carefully explored so that the use of feedback in the field can have a maximum positive effect on productivity.

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APPENDIX A: SAMPLE PURCHASE REQUISITION

PURCHASING REQUISITION Form 12 Rev. 1976

INSTRUCTIONS – INCLUDE IN EACH REQUISITION ONLY SUCH ARTICLES AS MAY BE PURCHASED FROM ONE FIRM. GIVE EXPLANATION IF SPECIAL HANDLING IS DESIRED. If this is a Physical Plant Order, submit two copies.

DEPARTMENT COMPLETES UNSHADED AREA

DEPT. OR FUNCTION: COMPTER

RES.CODE	DEPT.REF.	ACCOUNT NO.	DET.CLASS	AMOUNT
A		20-89897		A
B				B
C				C

VENDOR SUGGESTED: GENERAL STORES

DELIVER TO
STAFF MEMBER
ROOM NO.
BUILDING

REQUISITIONERS PHONE NO.

MATERIAL WILL BE USED FOR:

PURCHASING COMPLETES SHADED AREA

ORDER DATE

ORDER NO. 13

FOLLOW-UP DATE

VENDOR NO.

VENDOR

FOB ☐ PURDUE ☐ PURDUE PREPAY & ADD ☐ SHIPPING POINT ☐ SHIPPING POINT FREIGHT ALLOWED

TERMS ☐ NET ☐ REGULAR

BUYER

QUANTITY	ITEMS (GIVE FULL DESCRIPTION)		Multiple Fund Code	
14	0-09-000145	natural up left	1	
30	0-54-015030	guides	8	
20	0-54-016613	labels	8	
18	0-54-018720	pad	8	
100	0-54-020714	pen	8	
15	0-54-021602	blue pens	8	

REQUESTED -HEAD OF DEPT.	DATE	APPROVED--FOR THE COMPTROLLER	DATE
RECOMMENDED-DEAN OR ADMIN.OFFICER	DATE	APPROVED--FOR THE EXECUTIVE VICE PRESIDENT AND TREASURER	DATE

APPENDIX B: SAMPLE COMPUTER OUTPUT

STOREC20-1 CATEGORY - COMPUTER SUPPLIES GENERAL STORES INVENTORY STATUS 04/02/76 PAGE 06

BEGINNING BALANCE	RECEIPTS	ISSUES	ADJUST-MENTS	ON HAND	MINIMUM BALANCE	ORDER QTY	DESCRIPTION	CATALOG NUMBER
1618	17940	14154		5404	3000	1920	NATURAL UP LEFT	0-09-000100
97	120	155		62	70	120	NATURAL UP RIGHT	0-09-000105
71	40	67		64	50	120	RED STRIPE RIGHT	0-09-000110
110	60	75		95	50	120	BLUE STRIPE UP L	0-09-000115
116		25		91	10	120	SOLID GR UP LEFT	0-09-000120
47		17		30	10	120	SOLID YEL UP LEF	0-09-000125
80	360	226		214	120	120	MANILA FORTRAN L	0-09-000130
198				198			BINARY R STR U L	0-09-000135
							SYMBOLIC YEL STR	0-09-000140
	180	125		55	30	120	NATURAL UP LEFT	0-09-000145
71	3215	2669	1	618	1000	720	1411-1-2-15-1	0-09-000300
546	2400	2896		50			14 7/8 X 11-1 GR BAR	0-09-000305
153		46		107	20	120	1411-4-2-12-1	0-09-000310
141	288	336		93	80	144	026 KEY PUNCH	0-09-000500
206		24		182	50	144	1403 COMPUTER	0-09-000550
114	1200	856		458	180	20	TAPE MAGNETIC 2400'	0-09-001000
407	480	907	17	3-		480	TELETYPE ROLLS	0-09-005000
73	280	345		8		32	TELETYPE SETTER	0-09-005500
71	288	364	5			288	RIBBON TELETYPE	0-09-006000
77	175	198		54	44	44	TI PAPER 8 1/2X300FT	0-09-007000

APPENDIX C: **SAMPLE REORDER FORM**

PURCHASE ORDER

ORDER No.

THIS No. MUST APPEAR ON INVOICE, B/L, CASES, BUNDLES, PACKING LISTS AND CORRESPONDENCE

NAME OF COMPANY

STREET AND ADDRESS

DATE

CITY AND STATE

TO	QUOTATION INQUIRY No. TERMS MARK FOR
SHIP TO	SHIPMENT F.O.B. FRT. ALLOWED VIA

PLEASE SHIP THE FOLLOWING MERCHANDISE SUBJECT TO CONDITIONS BELOW:

To insure prompt payment mail invoice showing order number and with bill of lading attached, to general office, immediately after shipment is made. Advise promptly if unable to make immediate shipment. Please advise receipt and acceptance of this order promptly. No charges allowed for boxing, crating or packing. Goods subject to our inspection on arrival, notwithstanding prior payment to obtain cash discount. Goods rejected on account of inferior quality or workmanship will be returned to you with charge for transportation both ways plus labor, reloading, trucking, etc., and are not to be replaced except upon receipt of written instructions from us.

QUANTITY	UNIT	STOCK NO.	DESCRIPTION	PRICE	UNIT	AMOUNT

PURCHASING AGENT

PER

CASCADES L.-C227

PRINTED IN U.S.A.

APPENDIX D: SAMPLE OUT OF STOCK FORM

O[illegible]

T[illegible]
epartment

OUT OF STOCK

General Stores is temporarily out of the following materials you have requested:

ORD.	SHPD.	B.O.	DESCRIPTION

_____ PARTIAL SHIPMENT IS BEING MADE

_____
Purchasing Clerk

APPENDIX E: **PERFORMANCE SUMMARY SHEET**

PERFORMANCE SUMMARY

NAME: _____ DATE WORK WAS DONE: _____

NUMBER OF PURCHASE REQUISITIONS FINISHED: _____

PERCENT OF PURCHASE REQUISITIONS

WITH ONE OR MORE ERRORS: _____

APPENDIX F: **PERFORMANCE SUMMARY**
(Specific Feedback Condition)

PERFORMANCE SUMMARY: ERROR DISTRIBUTION

TYPE OF ERROR	NUMBER OF REQ. WITH THIS ERROR	PERCENT OF REQ. WITH THIS ERROR
Authorized Account #		
Item in Stock		
Re-Order Done		
Re-Order Correct		
B.O. Correct on P.R.		
B.O. Completed		
B.O. Correct		
Correct Deduction From Stock		
TOTAL		

APPENDIX G: PERFORMANCE SUMMARY
(Comparative Condition)

42

PERFORMANCE SUMMARY

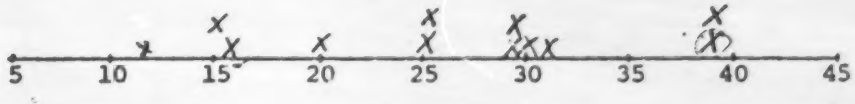
NAME:_____ DATE WORK WAS DONE:_____

NUMBER OF PURCHASE REQUISITIONS FINISHED:_____

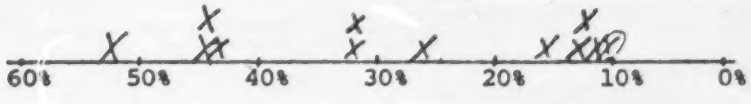
PERCENT OF PURCHASE REQUISITIONS

WITH ONE OR MORE ERRORS:_____

RELATIVE STANDING: NUMBER FINISHED:



RELATIVE STANDING: PERCENT WITH ONE OR MORE ERRORS:

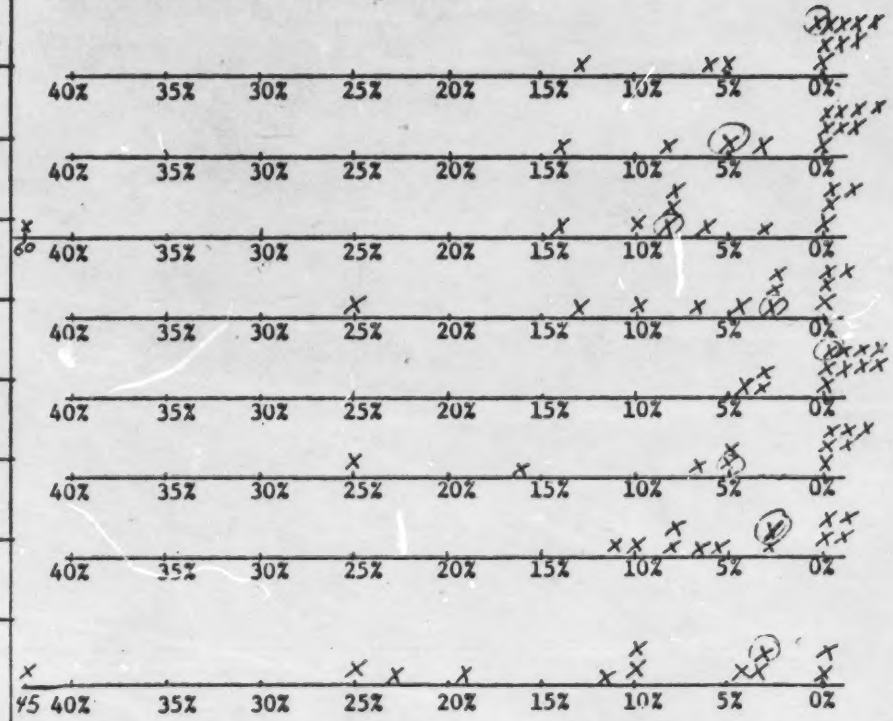


APPENDIX H: PERFORMANCE SUMMARY
(Comparative Condition)

PERFORMANCE SUMMARY: ERROR DISTRIBUTION

TYPE OF ERROR	NUMBER OF REQ. WITH THIS ERROR	PERCENT OF REQ. WITH THIS ERROR
Authorized Account #		
Item in Stock		
Re-Order Done		
Re-Order Correct		
B.O. Correct on P.R.		
B.O. Completed		
B.O. Correct		
Correct Deduction From Stock		
TOTAL		

RELATIVE STANDING: PERCENT ERRORS



APPENDIX I: **JOB SATISFACTION QUESTIONNAIRE**

NAME _____

Job Satisfaction

Ask yourself: How satisfied am I with this aspect of my job this week?

VS means I am very satisifed with this aspect of my job.

S means I am satisifed with this aspect of my job.

N means I can't decide whether I am satisfied or not with this aspect of my job.

DS means I am dissatisfied with this aspect of my job.

VDS means I am very dissatisfied with this aspect of my job.

On my present job, this is how I feel about:	VDS	DS	N	S	VS
1. Being able to keep busy all the time.	___	___	___	___	___
2. The chance to do different things from time to time.	___	___	___	___	___
3. The way my boss handles his subordinates. ...	___	___	___	___	___
4. The chance to do things for other people.	___	___	___	___	___
5. The chance to do something that makes use of my abilities.	___	___	___	___	___
6. My pay and the amount of work I do.	___	___	___	___	___
7. The freedom to use my own judgment.	___	___	___	___	___
8. The chance to try my own methods of doing the job.	___	___	___	___	___
9. The working conditions.	___	___	___	___	___
10. The way my co-workers get along with each other.	___	___	___	___	___
11. The praise I get for doing a good job.	___	___	___	___	___
12. The feeling of accomplishment I get from the job.	___	___	___	___	___
	1	2	3	4	5

13. This job:

Pays very well	Pays fairly well	Pays about average	Pays fairly poorly	Pays very poorly
5	4	3	2	1

14. Choose the one of the following statements which best tells how well you like your job. Place a check mark (✔) in front of that statement.

1 _____ I hate it.
2 _____ I dislike it a lot.
3 _____ I don't care for it.
4 _____ I am indifferent to it.
5 _____ I like it.
6 _____ I am enthusiastic about it.
7 _____ I love it.

15. I am very sorry I ever took this job.

Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
5	4	3	2	1

16. I am entirely satisfied with this job.

Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

17. When I think of the amount of money I am making on this job, I am

Very Satisfied	Satisfied	Neutral	Dissatisfied	Very Dissatisfied
5	4	3	2	1

18. Compared to what my co-workers are getting paid for what they do:

1_____I'm getting far less money than I should
2_____
3_____I'm getting less than I should
4_____
5_____I'm getting paid about right
6_____
7_____I'm getting more than I should
8_____
9_____I'm getting far more than I should

APPENDIX J: **INTRINSIC SATISFACTION**

19. When I compare how much I do on this job with how much I get out of it I feel:

9_____Highly Overpaid
8_____
7_____Overpaid
6_____
5_____Paid about right
4_____
3_____Underpaid
2_____
1_____Highly underpaid

TASK REACTION QUESTIONNAIRE

Listed below are a series of statements relating to the requisitions that you have just completed. Please take your time and respond thoughtfully and honestly to these statements by indicating the extent to which you agree with each.

	Strongly disagree	Moderately disagree	Slightly disagree	Not Sure	Slightly agree	Moderately agree	Strongly agree
1. There are several important abilities of mine that were required in order to work effectively on this task.....	1	2	3	4	5	6	7
2. I liked the idea that I had enough freedom and responsibility to do the task the way I wanted.....	1	2	3	4	5	6	7
3. The challenge posed by this task really aroused my interest in it.....	1	2	3	4	5	6	7
4. My feeling while completing the task could best be described by the word excitement.....	1	2	3	4	5	6	7
5. At various times I felt like I was really achieving something while working on the task.....	1	2	3	4	5	6	7

	Strongly disagree	Moderately disagree	Slightly disagree	Not sure	Slightly agree	Moderately agree	Strongly agree
6. There is something about working on this task that I find very appealing.....	1	2	3	4	5	6	7
7. I enjoyed using what I consider to be a strong natural ability when it comes to this task.....	1	2	3	4	5	6	7
8. The nice feeling associated with working this task certainly was a determinant of how well I did.....	1	2	3	4	5	6	7
9. I really became absorbed with the task while working on it.....	1	2	3	4	5	6	7
10. This task gave me the opportunity to learn something new and interesting.....	1	2	3	4	5	6	7
11. The freedom I had to work at my own pace led me to really work hard on the task.....	1	2	3	4	5	6	7
12. The unpredictable qualities of the task were quite intriguing.....	1	2	3	4	5	6	7
13. This task gave me the opportunity to develop new skills.....	1	2	3	4	5	6	7
14. After working on the task for a while, I felt like a pretty competent individual.....	1	2	3	4	5	6	7
15. My talents were effectively utilized in working on this task.....	1	2	3	4	5	6	7
16. I liked the opportunity I had to decide for myself how I would complete the task.....	1	2	3	4	5	6	7
17. I would describe my time with this task as a pleasant experience.....	1	2	3	4	5	6	7
18. There was plenty of opportunity to exercise my ingenuity and inventiveness on this task.....	1	2	3	4	5	6	7

	Strongly disagree	Moderately disagree	Slightly disagree	Not sure	Slightly agree	Moderately agree	Strongly agree
19. After working for a while, I had the feeling that I was really good at this type of task.....	1	2	3	4	5	6	7
20. I felt considerable pride in knowing that I was doing well on the task.....	1	2	3	4	5	6	7
21. The task could accurately be described as fun.....	1	2	3	4	5	6	7
22. One source of motivation was the opportunity for independent thought and action while working the task.....	1	2	3	4	5	6	7
23. The task really held my attention from the very beginning.....	1	2	3	4	5	6	7
24. Time really flew by while I was working on the task.....	1	2	3	4	5	6	7
25. Working on this task seemed more like play than like work.....	1	2	3	4	5	6	7

APPENDIX K: **JOB DESCRIPTIVE SURVEY**

NAME_____

Job Descriptive Survey (Section Two)

Listed below are a number of statements which could be used to describe a job.

You are to indicate whether each statement is an accurate or an inaccurate description of this job.

Please try to be as objective as you can in deciding how accurately each statement describes this job -- regardless of whether you like or dislike this job.

Write a number in the blank beside each statement, based on the following scale:

How accurate is the statement in describing your job?

1	2	3	4	5	6	7
Very Inaccurate	Mostly Inaccurate	Slightly Inaccurate	Uncertain	Slightly Accurate	Mostly Accurate	Very Accurate

_____1. The job requires me to use a number of complex or high-level skills.

_____2. The job requires a lot of cooperative work with other people.

_____3. The job is arranged so that I do not have the chance to do an entire piece of work from beginning to end.

_____4. Just doing the work required by the job provides many chances for me to figure out how well I am doing.

_____5. The job is quite simple and repetitive.

_____6. The job can be done adequately by a person working alone -- without talking or checking with other people.

_____7. The supervisors and co-workers on this job almost never give me any "feedback" about how well I am doing in my work.

_____8. This job is one where a lot of other people can be affected by how well the work gets done.

_____9. The job denies me any chance to use my personal initiative or judgment in carrying out the work.

____10. Supervisors often let me know how well they think I am performing the job.

____11. The job provides me the chance to completely finish the pieces of work I begin.

____12. The job itself provides very few clues about whether or not I am performing well.

____13. The job gives me considerable opportunity for independence and freedom in how I do the work.

____14. The job itself is not very significant or important in the broader scheme of things.

APPENDIX L: ROLE PERCEPTIONS

Which do you feel is more important on this job, speed or accuracy? Speed refers to processing large numbers of requisitions in a short time; accuracy is processing requisitions without any mistakes.

1. Speed is much more important than accuracy.
2. Speed is a little more important than accuracy.
3. Speed and accuracy are equally important.
4. Accuracy is a little more important than speed.
5. Accuracy is much more important than speed.

There are several steps that you must go through in processing a requisition. We are trying to find out how easy you think it is to make mistakes at each step. Listed below are the various steps, and after each one is a rating scale for you to indicate how easy it is to make mistakes at that step.

A. Checking to see if the account number is on the approved account number list.

1	2	3	4	5
Extremely unlikely that a mistake would be made	Unlikely that a mistake would be made	Somewhat easy to make a mistake	Fairly easy to make a mistake	Very easy to make a mistake

B. Determine if there is enough stock in the inventory to fill the order (for each item).

1	2	3	4	5
Extremely unlikely that a mistake would be made	Unlikely that a mistake would be made	Somewhat easy to make a mistake	Fairly easy to make a mistake	Very easy to make a mistake

C. Change the inventory level to correct for shipped requisition.

1	2	3	4	5
Extremely unlikely that a mistake would be made	Unlikely that a mistake would be made	Somewhat easy to make a mistake	Fairly easy to make a mistake	Very easy to make a mistake

D Filling out purchase order for items that are either out of stock or fall below a minimun order point.

1	2	3	4	5
Extremely unlikely that a mistake would be made	Unlikely that a mistake would be made	Somewhat easy to make a mistake	Fairly easy to make a mistake	Very easy to make a mistake

E. Send"out of stock"report to requestor.

1	2	3	4	5
Extremely unlikely that a mistake would be made	Unlikely that a mistake would be made	Somewhat easy to make a mistake	Fairly easy to make a mistake	Very easy to make a mistake

F. Indicate on requisition that a back order has been placed.

1	2	3	4	5
Extremely unlikely that a mistake would be made	Unlikely that a mistake would be made	Somewhat easy to make a mistake	Fairly easy to make a mistake	Very easy to make a mistake

APPENDIX M: ASSESSED EFFORT–PERFORMANCE

NAME_____

EXPECTANCY

If you were working at an average pace on this job and you suddenly started working very hard, what would happen to the number of error-free requisitions you could finish?

+4 I would finish many more error-free requisitions in a day
+3
+2 I would finish a few more error free-requisitions in a day
+1
0 I would finish the same number of error-free requisitions as I would when working at an average pace.
-1
-2 I would finish a few less error-free requisitions in a day
-3
-4 I would finish many less error-free requisitions in a day

As my EFFORT goes up, my PERFORMANCE (number of error-free requisitions finished)

+3 goes way up
+2 goes up quite a bit
+1 goes up a little
0 stays about the same
-1 goes down a little
-2 goes down quite a bit
-3 goes way down

As my EFFORT goes down, my PERFORMANCE (number of error-free requistions finished)

+3 goes way up
+2 goes up quite a bit
+1 goes up a little
0 stays about the same
-1 goes down a little
-2 goes down quite a bit
-3 goes way down

PERFORMANCE - OUTCOME RELATIONSHIPS

Statements are presentd about performance on the job and various outcomes which may or may not be associated with performance on this job. You are to indicate in what way the outcome underlined in the item changes when your performance (the number of requisitions you finish per packet) goes up.

Below is a sample item.

EXAMPLE: As my performance (number of requisitions finished) goes up, my chances of being liked by my fellow workers:

-3	-2	-1	0	+1	+2	+3
Go Way Down	Go Down	Go Down A Little	Stay The Same	Go Up A Little	Go Up	Go Way Up

If you circle a 2 on this scale, it would indicate that you think that being a good performer would substantially increase your chances of being liked by your fellow workers. If you circled a 0, it means that you think improving your performance does not change your chances of being liked by your fellow workers.

Complete items 1 thru 8 below by circling your answer on the scale provided.

As my performance (number of requisitions finished) goes up, my chances of making a lot of money for the time I put in on this job:

-3	-2	-1	0	+1	+2	+3
Go Way Down	Go Down	Go Down A Little	Stay the Same	Go Up A Little	Go Up	Go Way Up

As my performance (number of requisitions finished) goes up, my chances of feeling a sense of accomplishment from doing the job:

-3	-2	-1	0	+1	+2	+3
Go Way Down	Go Down	Go Down A Little	Stay the Same	Go Up A Little	Go Up	Go Way Up

As my performance (number of requisitions finished) goes up, my chances of being thought of as a good worker by my supervisor:

-3	-2	-1	0	+1	+2	+3
Go Way Down	Go Down	Go Down A Little	Stay the Same	Go Up A Little	Go Up	Go Way Up

As my performance (number of requisitions finished)goes up, my chances of feeling nervous and anxious at the end of the work day:

-3	-2	-1	0	+1	+2	+3
Go Way Down	Go Down	Go Down A Little	Stay the Same	Go Up A Little	Go Up	Go Way Up

As my performance (number of requisitions finished) goes up, my chances of experiencing a feeling of self-confidence:

-3	-2	-1	0	+1	+2	+3
Go Way Down	Go Down	Go Down A Little	Stay the Same	Go Up A Little	Go Up	Go Way Up

As my performance (number of requisitions finished) goes up, my chances of enjoying doing the task:

-3	-2	-1	0	+1	+2	+3
Go Way Down	Go Down	Go Down A Little	Stay the Same	Go Up A Little	Go Up	Go Way Up

As my performance (number of requisitions finished) goes up, my chances of being able to make use of my abilities:

-3	-2	-1	0	+1	+2	+3
Go Way Down	Go Down	Go Down A Little	Stay the Same	Go Up A Little	Go Up	Go Way Up

As my performance (number of requisitions finished) goes up, my chances of being able to use my own methods for doing the work:

-3	-2	-1	0	+1	+2	+3
Go Way Down	Go Down	Go Down A Little	Stay the Same	Go Up A Little	Go Up	Go Way Up

RATING OF JOB OUTCOMES

Please rate how desirable each of these job outcomes is to you. That is, how much would you like to receive these outcomes

Outcomes	Extremely Undesirable	Moderately Undesirable	Slightly Undesirable	Neutral	Slightly Desirable	Moderately Desirable	Extremely Desirable
Making a lot of money for the time I put in on this job	-3	-2	-1	0	+1	+2	+3
Feeling a sense of accomplishment from doing the job	-3	-2	-1	0	+1	+2	+3
Being thought of as a good worker by my supervisor	-3	-2	-1	0	+1	+2	+3
Feeling nervous and anxious at the end of the work day	-3	-2	-1	0	+1	+2	+3
Experiencing a feeling of self-confidence	-3	-2	-1	0	+1	+2	+3
Enjoying doing the task	-3	-2	-1	0	+1	+2	+3
Being able to make use of my abilities	-3	-2	-1	0	+1	+2	+3
Being able to use my own methods for doing the work	-3	-2	-1	0	+1	+2	+3

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